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Hind limb and Finger Muscles  
of *Megaptera longimana*.

by

John Struthers



(American Naturalist 1885)

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ON THE RUDIMENTARY HIND LIMB OF MEGAPTERA LONGIMANA.<sup>1</sup>

BY JOHN STRUTHERS, M.D.

THE author remarked that the interest attaching to the structure of whales depends largely on the fact that they present numerous rudimentary structures. Megaptera is extremely rare on British coasts. This one appeared in the Firth of Tay, and after sporting for some weeks in sight of the inhabitants of Dundee, was at last mortally wounded, and towed ashore dead, at Stonehaven, near Aberdeen, on January 8, 1884. It was a male, forty feet in length. The pectoral fin, the chief character of this species, was twelve feet in length. The parts containing the rudimentary hind limbs were removed and carefully examined in the anatomical rooms at Aberdeen. The presence of a rudimentary

<sup>1</sup> Abstract of a paper read before the biological section of the British Association for the Advancement of Science at Montreal, August, 1884.

thigh bone in this species had been discovered many years ago by the late Professor Reinhardt, of Copenhagen. The object of the author's inquiry was to ascertain the precise anatomical relations of this rudimentary structure, and if possible to throw some light on its meaning. For comparison the author exhibited to the section the rudimentary bony thigh bone, about the size of a hen's egg, which he had found in a great fin-whale, the razor back (*Balænoptera musculus*), in 1871, and a series of specimens of the more developed thigh bone and cartilaginous tibia, which he had dissected in the Greenland right whale (*Balæna mysticetus*), and his drawings of the ligaments and muscles connected with these parts in the right whale (*Four. of Anat. and Phys.*, Jan. 7, 1881).

In this Megaptera he found the thigh bone to be entirely composed of cartilage, of a conical shape, the length five and a-half inches on the right side, four inches on the left. It was encased in a mass of fibrous tissue. This fibrous case was connected internally to its fellow of the opposite side; superficially and on the outside to the posterior pelvic muscular mass; and anteriorly, passing from the thigh bone itself, was a special band appearing like a fibrous prolongation of the bone. The thigh bone rested loosely on the pelvic bone without articular surface, but was bound loosely to the latter by a strong posterior ligament, and by a weaker ligament in the position of the hip joint in the right whale. A muscle about the size and shape of a forefinger, within a ligamentous tube, connected the thigh bone backwards to the great interpelvic ligament. This was the only muscular structure directly connected with the thigh bone. It would retract the bone. The fibrous connections of the bone were mainly adapted to resist outward and forward traction.

The author said, that looking to all these facts, the conclusion to which we must come is, that the thigh bone in Megaptera is a rudimentary structure, a vestige of a more complete limb possessed by some ancestral form from which the Megaptera is descended.

The skeleton of this Megaptera he hoped would be ready to be inspected by the members of the British Association at the meeting in Aberdeen in September, 1885.

ON FINGER MUSCLES IN MEGAPTERA LONGIMANA  
AND IN OTHER WHALES.<sup>1</sup>

BY JOHN STRUTHERS, M.D.

THE author's observation, showing the presence of finger muscles in *Megaptera*, was made on the individual beached at Stonehaven, near Aberdeen, on January 8, 1884, the description of the rudimentary hind limbs of which he had described at the meeting of the British Association at Montreal. The presence of muscles in the forearm of a whale had been first noticed by Flower (in *Balænoptera musculus*) in 1865, and described in the lesser fin-whale (*B. rostrata*) by Carte and Macalister in 1868, and by Perrin in 1870. The author had described these muscles in the *Journal of Anatomy and Physiology*, in *B. musculus*, in 1871; in *Hyperoödon bidens* in 1871 and 1873, and in the Greenland right whale, *Balæna mysticetis* in 1878. In *B. musculus* the muscles present were the flexor carpi ulnaris, flexor digitorum ulnaris, flexor digitorum radialis, and an extensor communis digitorum. *Hyperoödon bidens* is the first and as yet only toothed whale in which they have been found, except in the common porpoise, in which he found the flexor carpi ulnaris present. In *Hyperoödon* the extensor was divided into two, and much more developed than in *B. musculus*. In the Greenland right whale he found also an extensor carpi ulnaris and a flexor carpi radialis. In the narwhal, Beluga and common pilot whale (*Globicephalus melas*) he found these muscles to be present morphologically, but histologically represented by fibrous tissue and therefore reduced to the condition of ligaments.

Considering the enormous size of the pectoral fin in *Megaptera longimana*, he had been anxious to ascertain whether these finger muscles were present, and if so, whether they were more developed than in other finners, or more rudimentary. He found the same flexor muscles present as in *B. musculus*, but the two flexor muscles of the fingers, instead of being larger were together not half so large as in *B. musculus*. Also that the proportions of these two muscles were reversed, the ulnar flexor being about one-third the size of the radial flexor, instead of larger than it, as in *B. musculus*. The extensor aspect of the limb was not yet dissected, as he had had time just to examine the flexor aspect before

<sup>1</sup> Read before the American Association at Philadelphia, on Sept. 9.

leaving for Canada. The dissection of whales is no easy matter.

Here then we have these finger muscles in Megaptera not more developed in proportion to the size of the limb, but in a still more rudimentary condition. These facts, the author observed, could be reasonably explained only on the hypothesis of the descent of whales from some ancestor in which the fingers had more extensive movement.

